As shown in FIG. **20**, for 2.048 mchips/sec,
2048+2+2=2052 bits/ms=4104 bits/4 ms
Let 1 bit=1/32 symbol

256
32
+0.5
288.5
+ 35.5 CRC symbols
324

At higher data rates, the power is increased so that Eb/N_o is constant.

As shown in FIG. **21**, one has access to a fraction of a symbol. Thus, a chip clock and a symbol clock are required.

Demodulation

If phase varies due to Doppler or oscillator offset, then if the phase variation were small between adjacent bits, differential demodulation can be used.

Since the data d(t) suffers periodic sign changes due to phase variation, and d(t) and $d(t-T_b)$, which are adjacent bits, frequently suffer the same sign changes since the phase variation between them is small, b(t) can represent the differentially decoded data stream. Differential encoding must be used. If there were no phase variation, then b(t) has twice the error of d(t); see Taub and Schilling, PRINCIPLES OF COMMUNICATION SYSTEMS.

Thus, frequency and phase are locked to the best of ability, and differential decoding is used to compensate for estimation inaccuracies. If the frequency locking were perfect so that the phase were consistent, then coherent detection occurs and the error rate increases by a factor of two.

In the CP, 1 bit=1 symbol, so that the output of the 64 symbol-matched filter is the bit stream shown in the packet.

In the WLL & DCS chip, at low data rates, 1 bit is equal to 2 or more symbols. In that case the symbols are added prior to differential decoding. High data rates use less than 1 symbol.

It will be apparent to those skilled in the art that various modifications can be made to the spread-spectrum-matched-filter apparatus of the instant invention without departing from the scope or spirit of the invention, and it is intended that the present invention cover modifications and variations of the spread-spectrum-matched-filter apparatus provided they come within the scope of the appended claims and their equivalents.

We claim:

1. A method for operating a spread-spectrum-matched-filter apparatus, the spread-spectrum-matched filter apparatus using a programmable-matched filter having approximately 250 stages such that approximately 250 clock cycles are required for loading the 250 stages with input samples of a received spread-spectrum signal, the programmable-matched filter being capable of supporting a plurality of signals staggered in time, the method comprising the steps of:

loading, at a first clock cycle, the programmable-matched filter with a reference corresponding to a first signal;

outputting from the programmable-matched filter, during a second clock cycle, an output due to the first signal, the second clock cycle being later in time than the first clock cycle but within the 250 clock cycles;

loading, at a third clock cycle, the programmable-matched filter with a reference corresponding to a second signal, the third clock cycle being later in time than the second clock cycle but within the 250 clock cycles; and

outputting from the programmable-matched filter, during a fourth clock cycle, an output due to the second signal, the fourth clock cycle being later in time than the third clock cycle but within the 250 clock cycles.

2. The method as set forth in claim **1** further comprising the steps of:

loading, at a fifth clock cycle, the programmable-matched filter with a reference corresponding to a third signal, the fifth clock cycle being later in time than the fourth clock cycle but within the 250 clock cycles; and

outputting from the programmable-matched filter, during a sixth clock cycle, an output due to the third signal, the sixth clock cycle being later in time than the fifth clock cycle but within the 250 clock cycles.

3. The method as set forth in claim **2** further comprising the steps of:

loading, at a seventh clock cycle, the programmable-matched filter with a reference corresponding to a fourth signal, the seventh clock cycle being later in time than the sixth clock cycle but within the 250 clock cycles; and

outputting from the programmable-matched filter, during an eighth clock cycle, an output due to the fourth signal, the eighth clock cycle being later in time than the seventh clock cycle but within the 250 clock cycles.

4. The method as set forth in claim **3**, further comprising the steps of:

loading, at a ninth clock cycle, the programmable-matched filter with a reference corresponding to a fifth signal, the ninth clock cycle being later in time than the eighth clock cycle but within the 250 clock cycles; and

outputting from the programmable-matched filter, during an tenth clock cycle, an output due to the fifth signal, the tenth clock cycle being later in time than the ninth clock cycle but within the 250 clock cycles.

5. A method for operating a spread-spectrum-matched-filter apparatus, the spread-spectrum-matched filter apparatus using a programmable-matched filter having approximately 250 stages such that approximately 250 clock cycles are required for loading the 250 stages with input samples of a received spread-spectrum signal, the programmable-matched filter being capable of supporting a plurality of signals staggered in time, the method for operating the programmable-matched filter with five signals comprising the steps of:

loading, at clock cycle five, the programmable-matched filter with a reference corresponding to a first signal;

outputting from the programmable-matched filter, during clock cycle fifty and fifty-one, an output due to the first signal;

loading, at clock cycle fifty-five, the programmable-matched filter with a reference corresponding to a second signal;

outputting from the programmable-matched filter, during clock cycle hundred and hundred-one, an output due to the second signal;

loading, at clock cycle one-hundred-five, the programmable-matched filter with a reference corresponding to a third signal;

outputting from the programmable-matched filter, during clock cycle hundred-fifty and hundred-fifty-one, an output due to the third signal;

loading, at clock cycle one-hundred-fifty-five, the programmable-matched filter with a reference corresponding to a fourth signal;